Module 1 - Lecture 3

Expressions, Statements, Blocks, and Branches

Review

- Java overview
- IntelliJ overview
- Variables
  - Declaration vs Initialization
  - Naming best practices
- Arithmetic operators and expressions
- Type conversion

What is a Program?

- Data
- **Behavior** -> Today's focus

Expressions and Statements

- An **expression** is a construct made up of variables, operators, and method invocations.
- An expression **evaluates to a single value**.

- A **statement** forms a complete unit of execution.

- Think of expressions as words and statements as sentences. In that case, **code blocks** are paragraphs.

Code Blocks

- Code that belongs together can be written in blocks.
- What does this do?

```
{
    int length = 5;
    int width = 10;
    int area = length * width;
}
```

Scope

A variable's **scope** defines where in the program that the variable is exists (i.e. can be referenced). When code execution reaches a point where a variable is no longer referenceable, the variable is said to be **out of scope**.

Rules of Scope:

1. Variables declared inside of a method or block `{..}` are local variables and only available within that block.
2. Blocks can be nested within other blocks. Therefore, if a variable is declared outside of a block, it is accessible within the inner block.

Methods

- A **method** is a named block of code.
- A method can take multiple parameters and return zero or one result.
- A method has a declaration, which is made up of a few components in a certain order.
    - The name and parameters make up a **method signature**.

<Access Modifier> <Return Type> <Name> <Parameters>
Examples:

public double divide (int num1, int num2)
public void main (String[] args)

Let's Code!

Boolean Expressions

In programming, we often want to conditionally execute sections of code. Before we can do that we need to know how to check when we should run a section of code.

A **boolean expression** is an expression that produces a boolean value (**true** or **false**) when evaluated.

Comparison Operators

Given X = 5

OPERATOR	DESCRIPTION	COMPARING	YIELDS
==	IS EQUAL TO	X == 8	FALSE
		X == 5	TRUE
!=	IS NOT EQUAL TO	X != 8	TRUE
		X != 5	FALSE
>	IS GREATER THAN	X > 8	FALSE
<	IS LESS THAN	X < 8	TRUE
>=	GREATER THAN OR EQUAL TO	X >= 8	FALSE
<=	LESS THAN OR EQUAL TO	X <= 8	TRUE

Boolean (Logical) Operators

NOT

A	!A
FALSE	TRUE
TRUE	FALSE

AND

A	B	A && B
FALSE	FALSE	FALSE
FALSE	TRUE	FALSE
TRUE	FALSE	FALSE
TRUE	TRUE	TRUE

OR

A	B	A || B
FALSE	FALSE	FALSE
FALSE	TRUE	TRUE
TRUE	FALSE	TRUE
TRUE	TRUE	TRUE

BOOLEAN EXPRESSION

A statement which evaluates to a single boolean value.

Given A is TRUE and B is FALSE,
Evaluate the expression

(A && B) || (A && !B)

↓

(TRUE && FALSE) || (TRUE && !FALSE)

↓

(TRUE && FALSE) || (TRUE && **TRUE**)

↓

FALSE || (TRUE && TRUE)

↓

FALSE || **TRUE**

↓

TRUE

Boolean (Logical) Operators cont...

BOOLEAN EXPRESSION A statement which evaluates to a single boolean value.

XOR

A	B	A ^ B
FALSE	FALSE	FALSE
FALSE	TRUE	TRUE
TRUE	FALSE	TRUE
TRUE	TRUE	FALSE

A non-hybrid car must be powered, either by diesel, electric battery, gasoline, but not more than one.

Given boolean inputs for each type of power source, write an expression to verify if the car is a non-hybrid.

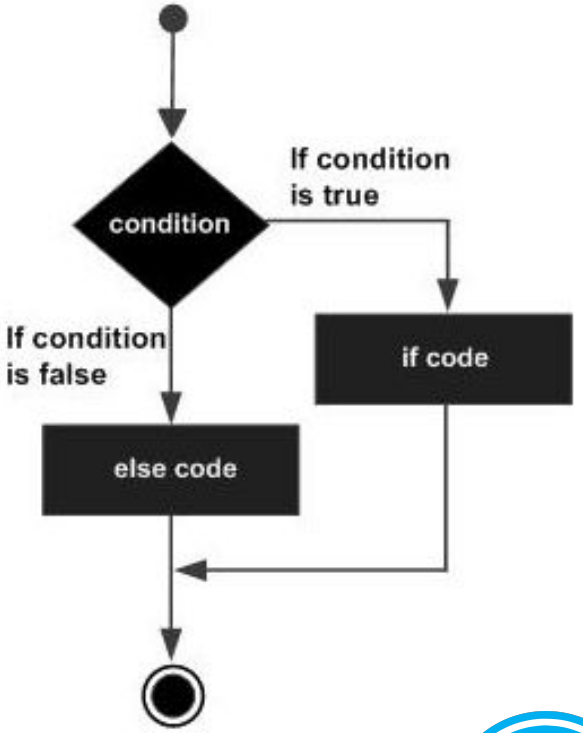
Challenge (breakout): How would you test if a car is a hybrid i.e. at least two power sources are used? No conditional logic allowed!

If Statements

Conditional blocks allow a program to take a different path depending on some condition(s) determined while the program runs.

Syntax:

```
if (boolean expression) {
    <if_code_here>
}
else {
    <else_code_here>
}
```



Let's Code!

Student Dashboard

URL: bos.techelevator.com

Reading

- Module 1
  - Arrays and Loops

QUESTIONS?